

CLAIMS

What is being claimed is:

1. A device comprising:
 - an array of semiconductor light emitting devices;
 - a first driver for supplying current to a first portion of the devices in the array, the first driver comprising:
 - a first switch capable of adjusting an amount of current supplied to the first portion;
 - a first control circuit capable of generating a first control signal for controlling the conductive state of the first switch;
 - a first control loop capable of controlling an amount of light generated by the first portion at a level represented by a first reference signal by adjusting a duty cycle of the first control signal;
 - a second driver for supplying current to a second portion of the devices in the array, the second driver comprising:
 - a second switch capable of adjusting an amount of current supplied to the second portion;
 - a second control circuit capable of generating a second control signal for controlling the conductive state of the second switch;
 - a second control loop capable of controlling an amount of light generated by the second portion at a level represented by a second reference signal by adjusting a duty cycle of the second control signal; and
 - a relative intensity control loop capable of limiting the duty cycles of the first and second control signals to a limit value, by decreasing values of the first and second reference signals by the same relative amount.
2. The device of claim 1, further comprising:
 - a third driver for supplying current to a third portion of the devices in the array, the third driver comprising:
 - a third switch capable of adjusting an amount of current supplied to the third portion;
 - a third control circuit capable of generating a third control signal for controlling the conductive state of the third switch;

a third control loop capable of controlling an amount of light generated by the third portion at a level represented by a third reference signal by adjusting a duty cycle of the third control signal;

wherein the relative intensity control loop comprising circuitry capable of limiting the duty cycles of the first, second, and third control signals to a limit value by decreasing values of the first, second, and third reference signals by the same relative amount.

3. The device of claim 2 wherein:

the devices in the first portion comprise devices emitting red light;

the devices in the second portion comprise devices emitting green light;

the devices in the third portion comprise devices emitting blue light.

4. The device of claim 1 wherein the relative intensity control loop comprises:

a first circuit part coupled to each of the control circuits, the first circuit capable of sampling the duty cycles of the control signals and selecting a highest duty cycle;

a first comparator coupled to the circuit, wherein the first comparator compares the highest duty cycle with a third reference signal representing a limit value of the duty cycle and generates an error signal based on the outcome of the comparison;

a second circuit part coupled to the first comparator, wherein the second circuit part generates a parameter based on the error signal; and

a multiplier coupled to the second circuit part and to the LED drivers, wherein the multiplier adjusts values of the first and second reference signals by multiplying them with the parameter.

5. The device of claim 4 wherein the absolute intensity control loop comprises:

a second comparator, wherein the second comparator compares a signal representing actual light intensity with a signal representing desired light intensity and generates an error signal based on an outcome of the comparison;

a third circuit part coupled between the first comparator and the second comparator, wherein the third circuit generates a fourth reference signal representing a limit value of the duty cycle.

6. The device of claim 5 wherein the signal representing the actual light intensity is a signal representing the actual light intensity of green light generated by the array.

7. A device comprising:

- an array of semiconductor light emitting devices;
- a plurality of driver circuits for supplying current to portions of the devices in the array, each driver circuit comprising:
 - a first comparator having a first input coupled to receive a signal representing an actual amount of light output by the portion of the array, a second input coupled to receive a reference signal, and an output, said first comparator providing a first error signal at the output based on comparison of the signal representing the actual amount of light and the reference signal;
 - a first circuit part having an input coupled to the terminal of the first comparator, the first circuit part also having an output, the first circuit part providing a signal corresponding to a duty cycle of a control signal at the output;
 - a second circuit part having an input coupled to the output of the first circuit part, the second circuit part also having an output, the second circuit part providing a control signal having a duty cycle proportional to the signal received from the first circuit part at the output; and
 - a switch coupled to the output of the second circuit part; and
- a relative intensity control loop for limiting the duty cycles of each of the control signals to a limit value by decreasing the values of the reference signals by the same relative amount.

8. The device of claim 7 wherein the relative intensity control loop comprises:

- a third circuit part having inputs coupled between the inputs of each of the second circuit parts and the outputs of each of the first circuit parts, the third circuit also having an output, the third circuit selecting a highest duty from the duty cycles at each of the inputs and providing the highest duty cycle to the output;

- a second comparator having a first input coupled to receive the output of the third circuit part, a second input coupled to receive an additional reference signal, and an output, the second comparator providing a second error signal to the output based on comparison of the signals at the first input and second input;

a fourth circuit part having an input coupled to the output of the second comparator, the fourth circuit part also having an output, the fourth circuit part providing a parameter to the output based on the second error signal; and

a multiplier having an input coupled to the output of the fourth circuit part, inputs coupled to the reference signals of the driver circuits, and outputs, the multiplier multiplying the reference signals by the parameter received from the fourth circuit part and providing the multiplied reference signals to the outputs.

9. The device of claim 8 further comprising an absolute intensity control loop comprising:

a third comparator having a first input coupled to receive a signal representing actual light intensity from the array, a second input coupled to receive a signal representing desired light intensity from the array, and an output, the comparator generating a third error signal based on comparison of the signals at the first and second inputs; and

a fifth circuit part having an input coupled to the output of the third comparator and an output coupled to the second input of the second comparator, the fifth circuit part providing to the output the additional reference signal, the additional reference signal representing a limit value of the duty cycle.